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MICROBIAL AND DRUG SUSCETIBILITY STUDY ON PEDIATRICS URINARY TRACT INFECTIONS IN MAYSAN IRAQ

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Abstract: *One hundred patients suspected of having urinary tract infections were investigated between August 2013 and March 2014 in Al-Sadder Hospital, Amara, and Maysan, Iraq. They were 51 males and 49 females and their ages ranged between 4 months and 13 years. In the present study, the most common bacterial causative organism is E. coli followed by Proteus spp regarding the outcomes of the treatment; it was found that the most efficient antibiotics are Amikacin and Meropenem. Meanwhile, Ampicillin and cotrimoxazole showed high resistance. Alarming resistance has begun to third generation cephalosporins.*

Key words: UTI, Cephalosporins, Proteus, Escherichia.

INTRODUCTION

The urinary tract infections (UTI) may result from microbial invasion of any of the tissues extending from the urethral orifice to the renal cortex. It is defined as the presence of 100,000 or more colony forming units (CFU) of bacteria per milliliter of

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urine, although smaller colony counts can be of diagnostic importance, particularly in young women, where 1,000 bacteria per CFU may be associated with cystitis or acute urethral syndrome. Although the infection and resultant symptoms may be localized at one site, the presence of bacteria in the urine (bacteriuria) places the entire urinary system at risk of invasion by bacteria (1).

The basic forms of UTI are Pyelonehritis, Cystitis and Asymptomatic bacteriuria. Microorganisms can reach kidneys mainly by ascending from the lower urinary tract. However, UTI occasionally occur in the course of septicemia or infective endocarditis (2). UTI are more common in females than in males. This may be partly because the female urethra is shorter and closer to the anus, which allows bacteria from the intestines to come into contact more easily with the urethra. Men also have an antibacterial substance in their prostate gland that reduces risk of UTI (3).

UTIs in children are often a sign of underlying structural or functional abnormalities that predispose them to recurrent infections. Some studies have shown that recurrent UTIs in children are associated with long-term renal dysfunction. Therefore, some experts recommend close follow-up and imaging in young children, even after the first infection (4). Lower UTIs typically resolve after a course of antibiotic therapy. Persistent or promptly recurring symptoms suggest improper antibiotic selection; the presence of unsuspected upper UTI, which requires a longer course of antibiotic therapy; or a complication (1, 3 & 4). Empiric antibiotic therapy should be initiated on the basis of the patient's symptoms and urinalysis results before urine culture results are obtained. Antibiotics are usually required to eliminate symptomatic infection. Treatment may be modified based on the results of urine culture (3). The bacteria usually originate from the bowel, vagina, or skin as normal flora of the host. The most common causes of UTI are: *Escherichia coli* which cause 85% of community-acquired infections, *Klebsiella pneumonia*, *Proteus* and *Providencia* species, *Pseudomonas Aeruginosa*, *Enterobacter* and *Serratia* species (5). Multiple microbial organisms causing infection may be found in patients with renal calculi, chronic renal abscesses, indwelling urinary catheters, or a fistula between the bladder and either the bowel or the vagina (6 & 7).

MATERIAL AND METHODS

Study Population

A total number of 100 patients clinically suspected of having urinary tract infection seeking a medical advice in AL-Sadder Teaching Hospital were involved. The study group comprised of 51 males and 49 females with age range from 4 months to 13 years, during a period from the first of August 2013 to the first of March 2014.

Collection of Samples

The patients (or the relatives of the small aged patients) were properly instructed on how to collect the sample and under aseptic conditions Clean Catch Mid-Stream specimen of urine was collected from each patient, and then immediately transported to microbiological laboratory in AL-Sadder Teaching Hospital for further processing. The name, age and sex were clearly mentioned on the container containing specimen.

Culturing of the samples

A modified semi-quantitative technique using a standard calibrated bacteriological loop of urine to transfer 0.01 ml of urine sample on Blood agar and MacConkey agar media. After allowing the urine to be absorbed into the agar, the plates were then inverted and incubated at 35-36°C for 18-24 hrs.

Identification

After the identification of Gram positive (GP) bacteria and Gram negative (GN) bacteria by using crystal violet stain. Microbial Identification and antibiotic susceptibility testing by using VITEK 2 compact:

Principles

The VITEK 2 is an automated microbiology system utilizing growth-based technology. The systems accommodate colorimetric reagent cards that are incubated and interpreted automatically.

Suspension Preparation

A sterile swab or applicator stick is used to transfer a sufficient number of Colonies of a pure culture and to suspend the microorganism in 3.0 mL of sterile saline (aqueous

0.45% to 0.50% NaCl, pH 4.5 to 7.0) in a 12 x 75 mm clear plastic test tube. The turbidity is adjusted accordingly and measured using a turbidity meter called the Densi-Chek (the turbidity should be 0.5- 0.65).

Choosing the cards

The identification card (ID) and the antibiotic susceptibility testing (AST) card used according to the type of bacteria. For GP bacteria will choose AST-P and for GN bacteria will choose AST-N.

Procedures

Tow test tubes containing the microorganism suspension are placed into a special rack (cassette) and the identification card is placed in the first one and the antibiotic susceptibility card in the second one. The filled cassette is placed manually into a vacuum chamber station. After the vacuum is applied and air is re-introduced into the station, the organism suspension is forced through the transfer tube into micro-channels of the cards. Then the rack (cassette) transfers to the reading room for automated reading. Reading of the (ID) will take 4 hours, while reading of the (AST) card will take 12-16 hours (1, 2, 4 & 7). The Study was conducted on 8 antibiotics of different groups, which were: Ampicillin, Gentamicin, Amikacin, Co-trimoxazole, Ceftazidime, Ceftriaxone, Ciprofloxacin, and Meropenem.

RESULTS

Thirty four males' patients out of 51 were found suffering from UTI which represent 66% mean while 71% of female (35 out of 49) were infected. When the culture of urine specimens was done on MacConkey agar and Blood agar media, it was observed that the majority of the isolates were of gram negative bacilli with *Escherichia coli* (52.17%) being the predominant pathogen followed by *Proteus* spp (11.59%), *Klebsiella* spp (8.69%) and *Morganella morganii* (8.69%). These results are shown in table (1).

Among these antimicrobial drugs tested, the sensitivity rate was Amikacin (95%), Meropenem (91%) followed by, Ciprofloxacin (73%), table 2.

DISCUSSION

Urinary tract infections are one of the most commonly diagnosed infections in our hospital and probably in every hospital. Microorganisms causing UTI vary in their susceptibility to antimicrobials agents. The percent positivity for urinary cultures was found to be 69% (69 out of 100 samples). The possible explanation behind such low positive isolation rate in highly suspected cases by clinical base may be due to:

1. Prior use of antibiotics by those patients.
2. Possible technical error during collection, transportation and processing of samples.

The prevalence of UTI occurred more in females than in males. Of the isolates obtained, 71% were from females while 66% were from males. These results also agree with (5 & 8), which showed that UTIs are more frequent in females than males.

UTIs are caused by a variety of microorganisms, including both gram positive and gram negative bacteria. The etiology of UTI has been regarded as well established & reasonably consistent. In our study *Escherichia coli* (52.17%) was predominant isolate followed by *Proteus* spp. (11.59%) and *Klebsiella* spp. respectively. These findings disagree with (5), which indicated that gram negative bacteria and mostly *E. coli* (75-90%) followed *Klebsiella pneumoniae* not *Proteus* spp are the most common causative agents in UTIs.

Also the study showed that *Morganella morganii* is a considerable causative agent (8.69%) similar to that of *Klebsiella* spp. The most efficient antibiotics in this study were Amikacin, Meropenem, and Ciprofloxacin. Ampicillin and Co-trimoxazole had shown resistance. Similar findings were observed by (1).

The possible explanation behind the resistance showed to these antibiotics, may be because these antibiotics have been in use for a long period of time and must have been abused and as a result the micro- organisms have developed mechanisms of circumventing their mode of action. Alarming finding seen in the study was that, the substantial resistance shown to third generation cephalosporins (Ceftazidime and Ceftriaxone) which can be explained by the frequent and improper use of these antibiotics.

RECOMMENDATIONS:

1. Educate the patients and the families to avoid the preventable risk factors of UTI.
2. Public awareness of manifestation of UTI and proper use of antibiotics.
3. Continuous statistical records of antibiotics sensitivity to help physician for choosing appropriate antibiotics.
4. Syndicate of Iraqi pharmacists to help in instruction of antibiotics.

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Table 1: Percentage of bacterial agents in UTIs

Bacteria	No. of patients	Percentage
Escherichia Coli	36	52.17 %
Proteus spp	8	11.59 %
Klebsiella pneumonia	6	8.69 %
Morganella morganii	6	8.69 %
Staphylococcus aureus	5	7.24 %
Pseudomonas Aeruginosa	3	4.34 %
Staphylococcus epidermidis	2	2.89 %
Enterococcus faecalis	2	2.89 %
Staphylococcus Hemolytica	1	1.44 %

Table 2: Percentage of antibiotics sensitivity and resistance

Antibiotic	No. of sensitive samples	Percentage %	No. of resistant samples	Percentage %
Amikacin	66	95.6	3	4.3
Meropenem	63	91.3	6	8.6
Ciprofloxacin	51	73.9	18	26
Gentamicin	36	52.1	33	47.8
Ceftazidime	32	46.3	37	53.6
Ceftriaxone	31	44.9	38	55
Co-trimoxazole	18	26	51	73.9
Ampicillin	11	15.9	58	84

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